

RESEARCH NOTE



CENTRAL STATES FOREST EXPERIMENT STATION
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UNDERPLANTED HARDWOODS FAIL TO MAKE MERCHANTABLE TREES

Will hardwoods planted under a nurse crop of pine, black locust, or sassafras stands survive and develop into merchantable trees? On upland old fields of southern Illinois the answer is apparently no. On a 23-year-old underplanting study on old fields, the survival, growth, and quality of white oak, red oak, black cherry, yellow-poplar, and green ash were generally unsatisfactory when planted under young stands of planted black locust, planted shortleaf pine, or natural sassafras.

Underplanting was done in 1940 on the Kaskaskia Experimental Forest in southern Illinois.^{1/} All underplanted trees were spaced about 6 by 6 feet. The overstories were 8 to 10 feet tall and had canopies of about equal density. The black locust and pine had been planted 6 by 6 feet. The overstory was intended to serve as a nurse crop for the underplanted trees.

Twenty-three years later the pine had grown to about 50 feet tall and the canopy was completely closed. The sassafras had grown to about 30 feet tall and the canopy was half closed. The black locust had grown to about 50 feet tall and the canopy was half closed because many trees died.

Survival and growth for the underplanted trees were generally poor (table 1). Only white oak, red oak, and black cherry under the pine, and white oak under the sassafras, had greater than 70 percent survival. The fastest growing trees, black cherry and yellow-poplar planted under the black locust, grew only 1.3 feet in height and only 0.2 of an inch in diameter per year. All of the other underplanted trees averaged less than 1 foot of height growth per year.

^{1/} Chapman, A. G. and Lane, R. D. Effects of some cover types on interplanted forest tree species. U.S. Forest Serv. Cent. States Forest Expt. Sta. Tech. Paper 125, 15 pp. 1951.

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Table 1.--Average survival, height, and d.b.h. for
five underplanted hardwoods after 23 years

AVERAGE SURVIVAL (in percent)						
Cover	: White : oak	: Red : oak	: Black : cherry	: Yellow- : poplar	: Green : ash	
Locust	39	27	49	35	17	
Pine	73	72	74	4	40	
Sassafras	71	53	19	48	20	

AVERAGE HEIGHT (in feet)					
Locust	17	23	37	36	17
Pine	9	10	16	14	5
Sassafras	10	15	6	22	3

AVERAGE D.B.H. (in inches) (For trees 1.6 inches d.b.h. and larger)									
Locust	(19) ^{1/}	3.0	(19)	3.2	(53)	6.2	(35)	6.1	(10) 3.0
Pine	--		(2)	2.0	(39)	2.5	(3)	.9	--
Sassafras	(12)	2.2	(17)	2.3	--		--		--

^{1/} Numbers in parentheses indicate number of trees 1.6 inches d.b.h. and larger.

FIGURE 1.--Yellow-poplar
grew fast under the lo-
cust but the stems were
crooked and scarred.



Most of the yellow-poplar trees planted under the locust were forked, crooked, and severely scarred (fig. 1). Also, wind whipped the thorny black locust branches into the thin bark of the yellow-poplar and caused many lesions and broken branches. Yellow-poplar stems in the sassafras were straight and unscarred, although small. Black cherry is normally crooked in this area.

It appears that hardwoods should not be planted under pines, sassafras, or black locust on upland old fields in southern Illinois. Very few underplanted hardwoods can be expected to survive and develop into merchantable trees.

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